EDUCATION GROUP

NEWSLETTER

ELECTRICAL ENGINEERING DIVISION

Published for the joint membership of the IEEE Education Group and ASEE Electrical Engineering Division. Statements and opinions expressed are not necessarily those of the Societies.

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NEXT ISSUE: February 1972

ASEE Electrical Engineering Division Forum Annual Business Meeting

1. New Officers Elected
   Chairman - David L. Johnson
   Vice Chairman - John C. Hancock
   Secretary/Treasurer - Wayne Chen
2. Reports of Ad Hoc Committees on Interdisciplinary Education and Curriculum and Educational Technology were presented. These reports are summarized elsewhere in the Newsletter. Concern was voiced by the members in not having sufficient time to read reports by Ad Hoc Committees prior to the Annual Meeting. It was agreed that the Executive Committee will give consideration to this matter and hopefully evolve a means by which information can be disseminated prior to the meeting. The Newsletter appears to offer a timely solution for including such information in summary form.
3. Chairman Johnson called attention to the IEEE education group's activities and Professor Jones gave a brief report on the past "Frontiers in Education" conference held in Atlanta. Professor Jones stated that the next conference is planned for April 24, 25, 26, 1972 at the University of Arizona at Tucson. Richard Dorf moved that the EE Division act as a participant for this conference with no financial aid. The motion was seconded and carried.
4. Chairman Johnson invited comments from the membership relative to the type of program they would like to have evolve for the 1972 ASEE Meeting. Suggestions included employers input to formulate the electrical engineering curriculum, structured versus unstructured curriculum, the shifting emphasis in PhD programs, enrolling and retaining students in electrical engineering, and interdisciplinary education. Several suggestions were also made concerning possible ad hoc committees' needs for the forthcoming year. These included a criteria for evaluating unstructured curricula, scope and structure of electrical engineering departments, attracting and retaining electrical engineering students.

Proposed Amendment to Change IEEE's Mission will Appear on 1971 Ballot

For the first time in the history of the IEEE, the annual ballot will include a proposal by petition for an amendment to the IEEE Constitution. The petition, initiated by Dr. Victor Galindo, was signed by over 600 voting members, meeting the requirement of at least one third of one percent of the total number of voting members as listed in the official membership records at the end of 1970.

A copy of the proposed amendment will be mailed in September with each ballot. The proposed amendment calls for two missions for the IEEE. Under the proposed amendment, "the primary purpose of the IEEE" (with its scope limited to the United States and its territories) would be "to promote and improve the economic well being of the membership of the IEEE." The secondary purposes (applicable throughout the world) would be "scientific, literary, and educational."

Dr. V. Galindo makes the following statements in favor of the changes: (exerpt from Instrumentation and Measurements Group Newsletter)

"The need for an organization of electrical engineers with at least the partial purpose of seeking the engineers' economic well-being is patently clear. All other professional groups devote themselves to their membership's welfare. The American Association of University Professors' constitution is typical in that its "purpose is to advance standards, ideals, and the welfare of the academic profession." All trades organizations, skilled and unskilled, look after the economic interests of their membership. Church groups do the same. This is how our democracy works. Electrical Engineers, however, are not functioning as other professions and special interest groups do, with the result that our economic destiny is not even influenced, much less controlled, [illegible]

"The present IEEE constitution has in fact limited economic action by the IEEE since its purpose is defined as being purely scientific and educational. The actions taken by the IEEE this year have been designed, for example, to avoid altering our tax exempt status, even though altering this status would cost each member no more than $2.00 per year in dues. The result has been a sterile and redundant association with NSPE, an organization which never has recognized the majority of Electrical Engineers as practicing Engineering and still offers only a second class non-voting membership to non-registered Engineers.

"The engineering profession is sufficiently heterogeneous to warrant Electrical Engineers being separately represented in setting their own standards of qualifications, lobbying activities, pension plans, portable fringe benefits, and in protecting themselves from being unfairly treated in such matters as patent rights and other employee-employer relations. In regard to the latter, a long term effort that leads to contractual hiring and the acquistion of tenure appears very desirable. These and many other economic activities do support and need the support of the good scientific reputation of the IEEE. The IEEE has often lent its good scientific reputation, earned by all members, to industrial commercial interests. It is time it lent that reputation to the coadvancement of each individual member's scientific and economic interests. Although our present President, Dr. Mulligan has worked hard and sincerely in this direction, he has, by his own admission, been limited by our constitution.

"These amendments will offer the Electrical Engineer an opportunity to construct a profession which has the dignity, respect, and security that accompanies a group that controls scientific achievements, qualifications, and economic interests. The essential change being offered by the amendments is the addition of a new activity, an economic activity, to the IEEE. This new activity should not and will not in any way alter previous scientific activities. Some activities that the IEEE does engage in presently should be curtailed where they have no valid scientific or educational purpose and work to the serious detriment of the engineers' economic interests. One such activity is that of the IEEE Pre-College Guidance Committee which is presently spending members' dues in this year of high unemployment to "encourage [high school] students to consider engineering as a career." Those members who do agree with the basic objectives of these amendments, but who may have a special preference for other wording, should reflect deeply whether there is really an essential difference between their objectives and the opportunity for a revitalized profession that these amendments offer. I hope that Electrical Engineers do not lose this opportunity through petty semantic bickering."

Continued...

J.H. Mulligan, Jr., President IEEE, expressed these views on the proposal in a memorandum to IEEE Group Chairmen, Society Presidents and Section Chairmen.

"I believe that you are aware that a proposal for a change in the IEEE Constitution will be presented to the membership for an expression of its opinion in September, 1971. The proposal has been made by a group of members who feel that the present objectives of the Institute as stated in Article I, Section 2 of our Constitution are not adequate for our organization. Basically the substance of the proposal is to make the primary purpose of the IEEE the promotion and improvement of the economic well-being of the membership of the IEEE and the amendment, if adopted, would require that the Institute (".. promptly enact suitable bylaws and... vigorously and judiciously pursue all other activities necessary or desirable for the attainment..." of this goal.") Therefore, although it is not possible for me to express the IEEE position in this matter at this time, in view of the numerous inquiries that I have received, I believe that a useful purpose may be served by my sharing with you the recommendation on this subject which I presently intend to convey to the Board of Directors. In bringing this view to your attention I am speaking with the perspective of the President of the IEEE, but as an individual. The position which I express here has not been approved by the Executive Committee or by the Board of Directors."

"Those of you who have been following my monthly reports to the membership in the "Inside IEEE" columns of SPECTRUM recognize my concern for the economic well-being of the members of our profession and are aware of the tangible steps that have been taken to meet the various nontechnical needs of our membership in this time of crisis. During the last eight months the Institute has responded specifically to the expressed desires of many of its members in the initiation of programs dealing with problems of mid-career guidance, with study of economic conditions in the industries affecting our membership, with the alleviation of unemployment, and with similar matters vital to the development of one's professional career. The initiation and support of these various programs within the Institute, including the creation in mid-year of a new headquarters activity in the field of career development, gives ample evidence that the present leadership, including your President, recognizes the vital importance to our members of action in this area. To me, the basic point involved, however, is the degree to which the nontechnical activities receive emphasis compared to the technical. I believe that the electrical engineering progession in particular, and the engineering community in general, will best be served by having strong technical societies concerned primarily with individual technical specialties and a single national organization concerned with matters of economic well-being of all engineers. Therefore, it is my considered judgment that it would not be in the best interests of the electrical engineering profession in general, and the Institute in particular, to have the Constitution changed in accordance with the amendment in question."

"I have come to this conclusion because I believe that the electrical engineering profession acting alone would not constitute a force of sufficient strength in today's society to attain the level of effectiveness in the improvement of the economic well-being of the IEEE membership one might reasonably expect to be the intent of the amendment. Indeed, I believe that if the IEEE and the other prominent engineering societies were to take an independent, fragmented approach to the improvement of the economic well-being of their memberships, the net effect might well be counterproductive. On the other hand, it is my view that a single national organization in the U.S. which embraced substantially all the engineering specializations might exceed the threshold needed to be an effective force in achieving the numerous benefits which the proponents of the proposed amendment have identified."

"The members of our Institute have joined together to help one another in the generation and dissemination of technical information and by so doing furthering the profession as a whole, as well as their individual careers. The benefits which each individual member receives are derived largely from the time and cooperative effort contributed by literally thousands of volunteers in writing, presenting and reviewing technical papers and carrying out other functions associated with technical matters."

"It is my view that the change of the primary purpose of the Institute to one of promotion and improvement of the economic well-being of the membership could have serious divisive effect on our membership."

"In my judgment the primary purpose of the Institute should continue to be scientific and educational, directed toward the advancement of the theory and practice of electrical engineering, electronics, and the related arts and sciences. By no means, however, does this preclude attention to the many nontechnical aspects of an individual's career development which have been pursued in 1971, many of which have been reported in "Inside IEEE" in SPECTRUM."

"In the foregoing I have concentrated my comments on the proposed change of Article I, Section 2. The proposal for the Constitutional change also involves Article I, Section 3 and Article III, Section 3. I believe that each of these will have the effect of providing less opportunity for participation in Institute affairs on the part of those outside of the United States as contrasted with those within its boundaries or areas where the U.S. has territiorial jurisdiction. I shall recommend to the Board of Directors that they oppose these two changes as well as the amendment discussed above. In the development of society as a whole as well as that of the profession of electrical engineering, I consider it a step backward rather than forward for an institution such as the IEEE to take an action which would tend to isolate or separate one group of members from another on the basis of their geographic location. Indeed, the exchange of technical information across national boundaries, which can be accomplished best in a true transnational organization, is a pervasive force whose effect in improving the quality of life for all mankind is most significant."

Editorial Comment

Views on this important subject have been well documented in the SPECTRUM during the past months. It is clear that this is a difficult period for those whose jobs have been terminated, and many have left the profession or remain unable to secure employment. There has been a great deal of criticism of the technical societies, and among electrical engineers, the role and purpose of IEEE has been questioned. The following exerpt from an editorial by Dr. Allen P. Schell in the Antennas and Propagation Group Newsletter in my opinion places the subject in proper focus.

"It is obvious that the causes of the present situation are far deeper than the areas under IEEE control, but steps can be taken to turn the attention and resources of government and industry toward member concerns. The cure must start with a plan, and the plan with an understanding of the problem. In March, Dr. Mulligan convened a panel of experts to develop a plan for mid-career counseling and guidance. The results of this conference are guidelines for the IEEE for programs to help members confronted with career decisions or changes; to offer aid from the society of engineers rather than to leave each individual to try to deal with his problems alone. Next, the IEEE president assembled a group of leading industrial corporate officers to identify and quantify the forces acting on the electrical engineering industry, and to make projections of the state of that segment of the US economy that affects IEEE members jobs. This effort is an attempt to provide forecasts with the emphasis on electrical engineering and the viewpoint of professionals within the field. A task force has been directed to study the recently-passed clean-air bill and to determine the implication of this bill for the electronics industry. Implicit in the standards and legislative restrictions are unmet needs for analysis, studies, tests, and the development of a variety of electronic equipment. The report of the task force will be of value to both industry and universities, and will be made available to the membership.

At another level, Dr. Mulligan has been in contact with members of the executive branch of the Federal Government to convey a sense of the waste of human resources implicit in the present crisis and the urgency of the need for effective programs. He and the leaders of other technical societies have participated at a working conference with Dr. E.E. David, Jr., Science Advisor to President Nixon, and ranking officials of the Office of Management and Budget. Results are now appearing in terms of federal funds and programs to aid unemployed engineers. The issue is not who deserves credit for what part of these, but that the IEEE president took the lead in finding and developing the channels that bring needed programs to the membership. There is now a Joint Societies Employment Advisory Committee that is planning a pilot program of job matching. It is anticipated that, with support from the Department of Labor, the engineering unemployment problem in a severely affected area such as Los Angeles will be attacked through a series of approaches, including a professional matching of individual talents to job opportunities, and by addressing the attitudinal proglems of many engineers who have been subjected to repeated discouragements and whose confidence in their ability to change has been reduced. Again, the emphasis is on the community of engineers helping those in trouble, and the results of this program will have applicability at other areas in the country where professional employment is severely depressed.

At the local level, the AIAA-IEEE workshops for counseling unemployed engineers are continuing; these programs have been positively endorsed by many of the participants as a direct response to an immediate need.

Criticizing the leadership is an old and hollowed custom and it would be a shame to stop now. Certainly, some of the younger generation seem to have taken the idea to heart. But it is something else to try to contribute to the organization, to expend time and talent in programs that do not add to one's personal benefit, and to exercise the discipline necessary to accept roles other than kingmaker. There is a real need for volunteers to assist in IEEE programs. There is a desperate need for all members to become concerned with the IEEE and the issues of our times. Members have a right to expect something for their dues, but the time should be past when it is expected that professional problems are going

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REPORTS

Abstract of Report
Interdisciplinary Education and
Curricula Committee
Electrical Engineering Division - ASEE
C. Nelson Dorny - Chairman

Introduction

The changes in technology and in the needs of society which occur with the passage of time require an occasional analysis of our goals and methods in engineering education. Over the last decade the priorities of society have changed; new values have developed which have a strong social and environmental emphasis. Technology, apparently the most powerful change agent in our society, has been the catalyst. The unfeeling nature of technology has frustrated and alienated many non-scientific people, and has tarnished the image of engineering.

The need for technical help in the social-environmental field is clear. A fundamental appreciation for dynamics, feedback, and other engineering concepts is demanded. Yet, these new directions have high social and political content, content about which engineers know very little. A team effort is required. In order to be an effective member of a team which will work in these fields, the engineer must learn new languages, new theory, and obtain experience in new areas. Although the social-technical boundary can probably be crossed as easily by the engineer as it can be the social scientist, we as engineers must earn the respect and acceptance of our non-engineering co-workers in order to develop an effective interdisciplinary team.

Compared with the changes in the problems of society, engineering education has changed little in the last few decades. This lack of change results partly from the breadth of the field and partly from accreditation procedures and departmental structures. The departmental structure of most universities, which is useful for promoting specialization, tends to stifle interdisciplinary programs. An undergraduate school cannot do an adequate job of specialty training in four years. Additional training must take place either in graduate school or on the job. Our industrial partners must recognize and accept their vital role in the educational process.

Recommendations

As engineering educators we have a responsibility to guarantee the marketability of our students. Thus, even though this committee encourages innovation and experimentation in interdisciplinary programs, we believe our product should still be basically an engineer. On the undergraduate level, emphasis should be on a broad fundamental engineering education.

Engineering should be defined broadly. Experimenting with the curriculum should be encouraged. New options should be developed for the student. We should develop a problem focus rather than a tool focus in engineering education. We should expose the student to the social-economic environment; we should help him to break out of the bounds of his own department. We should make the student aware of the potential areas for application of his expertise.

We should show engineering students what other fields are really like in order to promote better communication between fields. We also need to pull non-engineers toward technology. A better understanding of science and technology on their part would lessen their alienation.

ASEE, as a professional society, should take a stand in support of interdisciplinary research and education.

Proposals

"Many experiments of an interdisciplinary nature have been discussed or implemented at various schools throughout the country. We pass these suggestions on in the nature of a menu. We hope these ideas will serve as a catalyst in the development of a diversity of interdisciplinary engineering programs."

(a) Encourage interdisciplinary interests on the part of the student.

(b) Develop a course at the freshman or sophomore level to provide an overview of engineering.

(c) Engineering professors should develop an interest in the humanities and social sciences; they should learn and demonstrate how social science concepts apply to engrg.

(d) Develop function or problem oriented courses in the social-environmental areas.

(e) Develop a core course at the graduate level on the topic of social issues in a technological society.

(f) Provide a course in ethics and professionalism.

(g) Provide an internship in engineering as part of the degree program.

(h) Relax or perhaps even remove the classical departmental structure in order to encourage interdisciplinary activity.

(i) Introduce an interdisciplinary pre-professional undergraduate degree developed around an individual student interest.

(j) Develop professional schools of engineering to build on a several year pre-professional undergraduate degree.

(k) Develop a totally new school. The program could taper from full-time study at the freshman level to 25% study at age 27. The latter work-study level would then continue throughout the career of the engineer.

(l) The difficulty in obtaining federal funds for interdisciplinary research could be solved by revenue sharing between the Federal Government and the university. The Government could apply restrictions on the grants. It could require that say, 25% of the funds be applied towards interdisciplinary research. Such a program would eliminate the piles of proposals which converge on Washington, as well as promote interdisciplinary activity throughout the country.

Examples

The Appendices describe several interdisciplinary programs being implemented. Copies of the Report may be obtained by contacting:

Professor Nelson Dorny
Electrical Engineering Department
University of Pennsylvania
Philadelphia, Pennsylvania 19104

Abstract of Report
Educational Technology Committee
Electrical Engineering Division - ASEE
Jack Stern - Chairman

The report provides an excellent summary of films and video tapes related to the field of electrical engineering. Various sources were consulted in compiling the over 300 entries with major contributions coming from the Commission on Education of the National Academy of Engineering and the video tape library of the U.S. Army. In preparing the report the authors were struck by the amount of information available on film and how it could be included in their courses. The catalog includes a brief content discription of each film or tape, date of preparation if known, and the source to be contacted.

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Copies of the report may be obtained by contacting:

Jack Stein
Associate Professor of Electrical Engineering
Pennsylvania State University
King of Prussia, Pennsylvania 19406

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to be solved by handouts from on high. Whether or not it is apparent to each of us, we are members of a defined group, and the rest of society sees us in that light. The time has come for a spirit of community among engineers, and a commitment to help the disadvantaged among us. The leadership of the IEEE has made their commitment and they are acting on specific programs addressed to member needs."

A copy of the proposed ammendment and comments of the Board of Directors will be included with the annual ballot.

All IEEE voting members are urged to vote

The IEEE Education Group is Advancing

The setting of new goals by the Education Group and the discovery of workers determined to implement them are all beginning to achieve results. Our group achieved nearly an 11% increase in membership at the end of 1970, compared with an annual increase of about 5% in the previous year. These increases are phenomenal in a time of tight economy. In fact, only one other group achieved a percentage membership gain greater than did the Education Group in 1970.

However, we need to continue to seek new members. We have a viable program underway and have much to offer new members. Each of you, by getting one new member apiece, can achieve for us a 100% increase in membership this year! Talk to your colleagues who are not members of G-25 (Education) and have them send their check for $5 to IEEE Headquarters, 345 East 47th Street, New York, New York 10017 if they are members of IEEE. Or, have them request information from Headquarters on becoming an IEEE member and a member of the Education Group.

W.B. Boast, Chairman
Ad Com on Education

1972 Conference on Frontiers in Education

April 24 - 26, 1972
Tucson, Arizona

CALL FOR PAPERS

The Education Group of the IEEE, with the co-sponsorship of the College of Engineering of the University of Arizona and the IEEE Tucson Section, and the participation of the Electrical Engineering Division of ASEE, is pleased to announce the 1972 Conference on Frontiers in Education to be held April 24-26, 1972, at the Ramada Inn, in Tucson, Arizona. The name of the Conference is the theme of the conference, FRONTIERS IN EDUCATION. The purpose is to bring together persons concerned with education in schools, colleges and universities, in industry, and government, to discuss new developments and new directions in engineering education.

Papers relating to the following areas are invited.

1. Evaluation in Education
   Evaluation of students in self-paced and no-grade or no-fail systems of instruction. Importance of evaluation of students to themselves, to faculty, to prospective employers. Evaluation of instructors. Evaluation of innovative systems of instruction. Cost-effectiveness of educational systems.
2. New Techniques in Instruction
   We are particularly interested in persons having real results and hard data to report.
3. Engineering Education and Professionalism
   Can engineering ever achieve truly professional status with only a four-year degree required? Should engineering schools be graduate professional schools, as in medicine and law? If so, should four-year technology programs provide the undergraduate education?
4. The Role of the Teacher
   If the lecture is dead, as widely reported, what is the role of the teacher? Source, manager, motivator, demonstrator, model, or what? What is the role of the affective domain in engineering education?
5. Engineering of Education
   It is generally agreed that education faces a cost crisis. Are there ways engineering can and should contribute to improvement in the cost-effectiveness of education?
6. Is Engineering Education Relevant?
   The priorities of the nation are shifting, with increasing emphasis on the quality of life. The "two-cultures" gap seems to be widening. What does this mean to engineering education and to engineering as a profession?

Authors wishing to present papers should send a synopsis (typically about 200 words) describing the scope of the paper to:

G.R. Peterson
Electrical Engineering Dept.
University of Arizona
Tucson, Arizona 85721.

Deadline for submission of synopses is Dec. 1, 1971. Speakers will be notified of acceptance by Jan. 5, 1972. Final drafts will be due Mar. 1, 1972, and will be published in the Conference Proceedings.

Committee Members Wanted

The IEEE Education Group's technical committee on Educational Technology wishes to augment its membership with one or two individuals with industrial experience in the area of educational technology. Interested persons who have participated in the design of hardware for educational use, have applied engineering methods to the design of educational systems or have similar experience are invited to write to committee chairman, Professor John C. Lindenlaub, Associate Professor of Electrical Engineering, Purdue University, Lafayette, Indiana, 47907.